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Hay Finishing with Forced Air

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Why Force Dry Hay?

The potential value in a hay crop is high. Equal amounts of TDN (total digestible nutrients) can be found in a 3½-ton yield of alfalfa as in an 80-bushel yield of corn.

Most farmers don't realize the full potential of the hay crop because of high harvesting losses. The nutrients in a crop of corn can be harvested with very little loss, but with present handling methods it is more difficult to preserve the nutrients in the hay crop. Alfalfa at early bloom stage has approximately 50 to 55 percent by weight of leaves and fine stems. These leaves contain up to 70 percent of the protein and 90 percent of the carotene of the plant.

Forced air-drying can preserve much of the feeding value of the hay crop compared to field drying for the following reasons.

1. Hay is exposed for a shorter time to the elements. Bleaching by the sun results in loss of green color, carotene, riboflavin and other vitamins. Field drying also increases the possibility of exposure to rain. The losses from leaching by rain may go as high as 40 percent of the total value of the hay.

2. With forced air-drying, hay is handled at 35 to 40 percent moisture, which preserves most of the leaves. Handling dry hay in the field results in a loss of many of the leaves due to shattering.

3. With continuous air flowing through the hay, any heat produced is carried away and therefore, losses resulting from over-heating are reduced.

Where Can Drying Systems Be Installed?

On most farms the present barn mow is suitable for drying. Separate hay-drying structures can also be used, such as the various hay sheds (including self-feeding structures). Hay can also be dried in an outside stack. Successful drying in specially constructed wagons has been done by using heated air. The wagons are loaded in the daytime and dried overnight.

A slatted A-frame duct, as shown here, is one of the systems used in Minnesota for drying hay.

How Much Air is Needed?

The amount of air required will depend upon the amount of hay to be dried at one time. Normally hay will be piled no higher than 6 to 8 feet on the first filling, and 4 to 6 additional feet on succeeding fillings.

For chopped and baled hay drying, the fan should deliver 2 to 3 cubic feet per minute per cubic foot of undried hay. Fan capacity is rated according to motor horsepower and resistance pressure in inches of water. Use 1¼" resistance pressure for fan selection.

For long, loose hay drying the fan should deliver 1½ to 2½ cubic feet per minute per cubic foot of undried hay. Use 3/4" resistance pressure for fan selection.

It is better to dry smaller amounts at shorter intervals than to try to dry large amounts at one time.

What Alterations Need To Be Done to the Barn?

1. The structure of the barn should be checked to see that it is strong enough to support the extra weight of the hay, since the hay is stored damp.
2. The mow floor must be air-tight. The air must flow through the hay to be effective and any air which leaks through the floor will be wasted. The floor can be covered with a new air-tight floor or with a layer of roll roofing.
3. Openings must be provided above the hay to the outside to permit the moist air to be exhausted. The total area of these openings should be at least twice the area of the air inlet to the fan.
4. Air intake opening must be provided with area at least twice the area of the fan opening.

Procedure For Field Work

Hay should be cut at the optimum stage of growth, which for alfalfa is about one-tenth bloom.

Hay can be cut in the morning after most of the dew has evaporated, left in the swath several hours and then raked. Or it can be cut late in the afternoon and wind-rowed the next morning. After the hay has dried down to about 40 percent it is ready for chopping. The time required for this will depend upon drying conditions. On a very good drying day, it may be 8 hours.

The use of a hay crusher or conditioner in the field will reduce the time required for the initial field drying.

At What Moisture Content Should Hay Be Put On the Drying System?

If hay is stored as long, loose hay, its moisture should be reduced to 45 percent before storage.

Chopped or baled hay should have its moisture content reduced to about 35 to 40 percent because it is denser and more difficult to dry.

How to Load the Drying System

For best results the hay should be spread evenly over the dryer in layers, with as little packing as possible. The dryer should be completely covered before starting the fan.

Long hay can be handled by the same methods used for dry, loose hay--but smaller amounts must be handled because of the increased weight.

Either a blower or an elevator may be used to load chopped hay on the system. Blower pipes for handling chopped, moist hay should be 6-inch or larger and in good condition to prevent clogging. When filling, it is necessary to have one man continuously directing the blower to get even distribution.

When a elevator is used, a barn distributer should also be used to spread hay.

Care must be taken in placing baled hay on the dryer so that no large air spaces are left for the air to pass through without going through the hay.

Avoid walking on the hay as much as possible. If it is necessary to get out on the hay, use a ladder or board.

How to Operate Your Drying System

As soon as all air outlets are covered with hay, start the fan and run it continuously until the hay is dry. It is advisable to operate the fan even during wet, rainy conditions. Under such conditions little drying will be accomplished, but the fan will keep the hay cool and prevent loss in quality from overheating.

When the hay on the surface appears dry, shut off the fan and leave it off over night. In the morning turn on the fan and check the air coming off above the hay to see if it is warm. If the air is warm, there are still damp spots in the hay so run the fan for another 24 hours and repeat the test. Drying time will vary a great deal depending upon the moisture content of the hay, the depth of the hay, and weather conditions. With good drying conditions, one filling of hay can be dried in about a week.

How Should the System Be Constructed?

There are a number of commercial prefabricated ducts on the market. A farmer can build his own, however, and there are three types commonly used: (1) The A-frame. This type is normally used for narrower barns and hay sheds or for outdoor stacks. (2) Main duct and slatted floor. (3) Main duct with side laterals.

For further information, consult your county agricultural agent, your hay-dryer dealer, your electric power supplier, or write to Agricultural Extension Engineer, University of Minnesota, St. Paul 1.

What Is the Cost of a Drying System?

Costs will vary considerably with different installations. But for a rough estimate, a figure of 75 cents per square foot of mow area can be used for the cost of the dryer. This includes the motor, fan and duct system.

The cost of drying hay with unheated air will vary from about $.75 to $1.50 per ton of dried hay.

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